fluid-handling and other elements of the instrument. It is well-known in the art that drive motors as used for such as syringe plungers, solenoids to drive diaphragms for pinch valves, multi-path switching valves, and the like, are all driven by AC or DC signals providing the voltage and current necessary to drive the specific elements. The I/O interface accepts computer-level signals from microprocessor 217 for manipulating elements of the instrument, and provides the correct signals as needed for each element in the voltage, current, and time required. There are also in many instances signals delivered back to I/O interface 709 from sensors in the instrument, such as position sensors on syringe plungers, which are translated to appropriate computer voltage and provided to microcontroller 217.

In the Claims:

Please amend claims 1, 4, 5, 10, 11, 16 (second occurrence), 22 (first occurrence), 23, 24, 28, 29 (first occurrence), 29 (second occurrence), 31, 33, 34, 36-38, 40, 43-47, 49-51, 54-57, 59, 60, 63-65, 68, 75, 79, 81, 84, 86, 88, 90, 94, 96, 100, 101, 103-105 as follows:

1. (Amended) An analytical apparatus to monitor fluid systems, comprising:

at least one extraction module having a raw sample reservoir connected by input fluid conduit to individual ones of said fluid systems, to extract raw samples for analysis from said fluid systems;

one or more modification modules comprising additive materials to modify the extracted raw samples prior to analysis;

an analytical device to receive at least a portion of said raw samples in an ordered sequence, and to determine concentration of at least one constituent of said sample portion;

fluid-handling apparatus for transferring fluid through the analytical apparatus; and

a computerized control and management system to manage operations of component modules and devices, and to report analytical results;

characterized in that the control and management system coordinates extraction of raw samples, modification as desired, introduction of fluids to the analytical device, and reporting of analytical results .

4. (Amended) The analytical apparatus of claim 3 wherein the processing environment is a fabrication system devoted to semiconductor integrated circuit manufacturing.

5. (Amended) The analytical apparatus of claim 3 wherein the modification modules comprise chemicals for altering the pH of extracted liquids.

10. (Amended) The analytical apparatus of claim 3 wherein the raw sample reservoir in the at least one extraction module is connected to a vacuum apparatus through a remotely-operable valve, to draw a relative vacuum in the reservoir to draw material from the fluid system connected by said input fluid conduit to the reservoir.

11. (Amended) The analytical apparatus of claim 10 wherein the raw sample reservoir is generally vertically-oriented and the conduit from the wet-bath enters at a height on the reservoir such that a liquid sample drawn into the reservoir may have a gas gap over the sample.

106. (Amended) The analytical apparatus of claim 15 wherein the precision translation mechanism comprises a stepper motor.

107. (Amended) The analytical apparatus of claim 21 wherein the control and management system is structured to vary the rate of plunger translation.

23. (Amended) The analytical apparatus of claim 20 wherein the syringe is connected through a three-way switching valve to the intermediate conduit to the chemical reservoir and to an output conduit to provide the precise volume sample to other elements of the analytical apparatus.

24. (Amended) The analytical apparatus of claim 20 wherein the portions of the solution provided to other elements are provided through a mixer having two or more inputs to one output, with one input connected to the chemical modification module and another connected to another module in the analytical apparatus.

28. (Amended) The analytical apparatus of claim 27 wherein the syringe comprises a plunger driven by the control and management system through a translation mechanism, enabling precision volume control.

108. (Amended) The analytical apparatus of claim 28 wherein the control and management system is structured to vary the rate of plunger translation.

29. (Amended) The analytical apparatus of claim 28 wherein the translation mechanism comprises a stepper motor.

31. (Amended) The analytical apparatus of claim 26 wherein the portions provided to other elements are provided through a mixer having two or more inputs to one output, with one input connected to the chemical modification module and another connected to another module in the analytical apparatus.

33. (Amended) The analytical apparatus of claim 27 wherein the isotope reservoir contains an isotope mixture in a solvent at a specific concentration, and further comprising a solvent reservoir in addition to the at least one isotope reservoir, the solvent reservoir containing the solvent common to the isotope mixture in the isotope reservoir, and a system of syringes, connecting conduits and mixers, enabling portions of the isotope mixture to be diluted before being provided to other elements of the analytical apparatus.

34. (Amended) The analytical apparatus of claim 33 wherein the isotope reservoir holds an isotope mixture in a concentration of about 1 part isotopes in one million parts of the mixture, and the system of syringes, connecting conduits and mixtures enables dilution of six orders of magnitude to about one part per trillion.

36. (Amended) The analytical apparatus of claim 35 wherein the plunger driven by the control and management system through a translation mechanism, enabling precision volume control.

37. (Amended) The analytical apparatus of claim 36 wherein the translation mechanism comprises a stepper motor.

38. (Amended) The analytical apparatus of claim 27 wherein individual ones of the syringes in the system of syringes are connected by switching valves to individual inputs to a mixer having a single output, such that, with one syringe holding a precise volume of an

isotope mixture at a first concentration and a second syringe holding a precise volume of the solvent, driving the plungers of the two syringes simultaneously creates an isotope mixture at the single output of a predetermined concentration less than the concentration of the mixture in the one syringe.

40. (Amended) The extraction module of claim 39 wherein the raw sample reservoir is generally vertically-oriented and the conduit from the liquid systems enters at a height on the reservoir such that a liquid sample drawn into the reservoir may have a gas gap over the sample.

43. (Amended) The extraction module of claim 39 wherein the syringe comprises a plunger with a translation mechanism drivable by a control and management system, enabling precision volume control.

44. (Amended) The extraction module of claim 43 wherein the translation mechanism is controllable at variable translation rates, enabling variation of fluid transfer rate.

45. (Amended) The extraction module of claim 43 wherein the translation mechanism comprises a stepper motor.

46. (Amended) The extraction module of claim 39 further comprising a flush reservoir connected through additional valves to the syringe, to the raw sample reservoir, to a source of flushing liquids, to a second vacuum source, to a cover-gas source, and to a drain line, such that the elements of the extraction module may be flushed and cleaned between sample cycles.

47. (Amended) In an analytical apparatus to monitor liquid systems, the apparatus having modules for extracting samples, modifying the samples, and analyzing the samples for concentration of specific constituents, a chemical modification module comprising:

a chemical reservoir having a solution of precisely compounded chemicals; and

apparatus for providing portions of the solution to other elements of the analytical apparatus.

49. (Amended) The chemical alteration module of claim 48 wherein the syringe comprises a plunger having a translation mechanism drivable by a control and management system, enabling precision volume control.

50. (Amended) The chemical alteration module of claim 49 wherein rate of translation of the translation mechanism is variable, enabling variation of rate of liquid transfer.

51. (Amended) The chemical alteration module of claim 49 wherein the translation mechanism comprises a stepper motor.

54. (Amended) The isotope dilution module of claim 53 wherein the mechanism for providing portions of the mixture comprises a syringe connected by intermediate conduit to the at least one isotope reservoir below a surface of the mixture in the reservoir, such that withdrawing a plunger of the syringe by a precise distance draws a precise volume of the mixture in the isotope reservoir into the syringe.

55. (Amended) The isotope dilution module of claim 54 wherein the syringe comprises a plunger having a translation mechanism drivable by a control and management system, enabling precision volume control.

56. (Amended) The isotope dilution module of claim 55 wherein the control and management system is structured to vary the rate of plunger translation.

57. (Amended) The isotope dilution module of claim 55 wherein the translation mechanism comprises a stepper motor.

59. (Amended) The isotope dilution module of claim 54 wherein the isotope reservoir contains an isotope mixture in a solvent at a specific concentration, and further comprising a solvent reservoir in addition to the at least one isotope reservoir, the solvent reservoir containing a solvent common to the isotope mixture in the isotope reservoir, and a system of syringes, connecting conduits and mixers, enabling portions of the isotope mixture to be diluted before being provided to other elements of the analytical apparatus.

60. (Amended) The isotope dilution module of claim 59 wherein the isotope reservoir holds an isotope mixture in a concentration of about 1 part isotopes in one million parts of the mixture, and the system of syringes, connecting conduits and mixtures enables dilution of six orders of magnitude to about one part per trillion.

63. (Amended) The isotope dilution module of claim 62 wherein the translation mechanism comprises a stepper motor.

64. (Amended) The isotope dilution module of claim 59 wherein individual ones of the syringes in the system of syringes are connected by switching valves to individual inputs to a mixer having a single output, such that, with one syringe holding a precise volume of an isotope mixture at a first concentration and a second syringe holding a precise volume of the solvent, driving the plungers of the two syringes simultaneously creates an isotope mixture at the single output of a predetermined concentration less than the concentration of the mixture in the one syringe.

65. (Amended) A method for monitoring fluid systems for concentration of selected species, comprising the steps of:

(a) drawing raw samples of the fluid systems one-at-a-time into at least one raw sample reservoir connected by input fluid conduit to individual ones of the fluid systems;

(b) modifying the raw samples by addition of material from one or more modification modules;

(c) providing measured portions of modified samples to an analytical device; and

(d) determining concentration of the selected species by a controller that receives output from the analytical device.

68. (Amended) The method of claim 67 wherein the wet baths are baths in a semiconductor fabrication unit devoted to semiconductor integrated circuit manufacturing.

75. (Amended) The method of claim 61 wherein, in step (a), a gas gap is maintained over a liquid sample drawn into the sample reservoir, by implementing the raw sample reservoir as a generally vertically-oriented container with conduit from the wet-bath entering at a height on the reservoir above a level anticipated for a sample volume in the reservoir.

79. (Amended) The method of claim 78 wherein the syringe is operated by a plunger driven through a translation mechanism, enabling volume control.

81. (Amended) The method of claim 80 wherein the translation mechanism comprises a stepper motor, and rate of translation is controlled by controlling the stepping rate of the motor.

84. (Amended) The method of claim 65 wherein, in step (b), chemicals are added in solution to samples from chemical modification modules comprising at least one chemical reservoir having a solution of precisely compounded chemicals and apparatus for providing portions of the solution to the samples.

86. (Amended) The method of claim 85 wherein the syringe is operated by a plunger driven through a translation mechanism, enabling precision volume control.

88. (Amended) The method of claim 86 wherein the translation mechanism is driven by a stepper motor.

90. (Amended) The method of claim 92 wherein portions of the sample are provided through a mixer having two or more inputs to one output, with one input connected to the chemical modification module and another connected to another module in the analytical apparatus.

94. (Amended) The method of claim 93 wherein the syringe is operated by a plunger driven through a translation mechanism, enabling precision volume control.

96. (Amended) The method of claim 95 wherein the rate is varied by controlling the step rate of a stepper motor driving the translation mechanism.

100. (Amended) The method of claim 92 wherein isotope mixtures are provided in different concentration levels by maintaining an isotope mixture in a solvent at a specific concentration in the isotope reservoir, and diluting portions of that mixture with solvent

from a solvent reservoir, the solvent reservoir containing the solvent common to the isotope mixture in the isotope reservoir, doing the dilution through a system of syringes, connecting conduits and mixers, enabling portions of the isotope mixture to be diluted before being provided to other elements of the analytical apparatus.

101. (Amended) The method of claim 100 wherein the isotope reservoir holds an isotope mixture in a concentration of about 1 part isotopes in one million parts of the mixture, and the system of syringes, connecting conduits and mixtures enables dilution of six orders of magnitude to about one part per trillion.

103. (Amended) The method of claim 102 wherein the plunger of an individual syringe is driven through a translation mechanism, enabling precision volume control.

104. (Amended) The method of claim 103 wherein the precision mechanism is driven by a precision stepper motor.

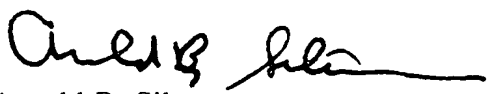
105. (Amended) The method of claim 103 wherein individual ones of the syringes in the system of syringes are connected by switching valves to individual inputs to a mixer having a single output, such that, with one syringe holding a precise volume of an isotope mixture at a first concentration and a second syringe holding a precise volume of the solvent, driving the plungers of the two syringes simultaneously creates an isotope mixture at the single output of a precise predetermined concentration less than the concentration of the mixture in the one syringe.

REMARKS

Attached hereto is a marked-up version of the changes made to the drawings, specification and claims by the current amendment. The attached page is captioned "Version with markings to show changes made."

Entry of the present amendment is respectfully requested.

Respectfully submitted,



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